WHEN THE GAS WAS REMOVED FROM THE ZONE OF TERRESTRIAL PLANETS? A. V. Vitjazev and G. V. Pechernikova, O. Yü. Schmidt Institute of Physics of the Earth, USSR Academy of Sciences, Moscow, USSR.

Some researchers believe that the gas was removed by strong solar wind, or has escaped from the exosphere of preplanetary disk heated by UV-radiation. One can suppose also that substantial quantities of nebular gas may have been lost during the turbulent spreading of preplanetary disk. But the parameters of the young Sun (the intensity of UV-radiation, the strength of solar wind) as well as the parameters of the disk (the coefficient of turbulent viscosity etc) are poorly defined.

Some constraints for the interval of gas escape from the zone of Jupiter and Saturn were received in the model of disk with moderate mass ($\approx 0.05\ M_\odot$). Such dissipation had to happen only after preaccretion solid cores of these planets ($3 \div 5\ m_\oplus$) have been accumulated, i.e. $\approx 10^7 \div 10^8$ y after formation of Sun and preplanetary disk[1].

We have unique possibility to estimate the moment of clearing of the disk in zone of terrestrial planets from the data of pre-compaction irrediation of meteorite grains. Most of researchers believe that such irradiation occured on the surface of primitive bodies [2]. The low density of tracks is usually explained by the short time interval of exposition ($10^5 \div 10^6$ y) ofancient planetesimal's regolith. Our estimates [3] have shown that the pre-compaction irradiation was occured already after the considerable dissipation of gas. In fact, the solar cosmic rays (SCR) could not penetrate into the central part of the gaseous disk with initial surface density of gas $\sigma = 10^3 \div 10^4$ g/cm^2. Only galactic cosmic rays could penetrate into the deep regions of the disk, but they produce the flux of secondary particles with spectrum different from SCR. Goswami and Lal [2, 4] supposed that pre-compaction irradiation of meteorite grains occured in regolith of primitive (C-chondrite's) spherical bodies with sizes 1-100 cm. But our estimates [3] have shown that even in absence of the gas the preplanetary disk on the distance 1-5 a.u. is opaque for the SCR until a stage when the substantial quantities of solid matter accumulated in the bodies with sizes $\sim$100-1000 km. In accordance with the theory of accumulation [1] the time $\approx 10^7 \div 10^8$ y is sufficient for the accumulation of such bodies. The same values give the estimates of interval of exposition of irradiated olivine grains.

In our model we investigated the swarm of bodies with mass spectrum $n(m,t) = c(t)m^{-q}$ where $c(t)$ and q ($1.3 \lesssim q \lesssim 1.8$) have been obtained from the coagulation theory. It was supposed that the grains in regolith on a small depth (< 0.1 cm) can be irradiated by SCR. We obtain that the major portion of irradiated material in accordance with [2] came from small bodies but only at the latest stages when the largest bodies in the swarm reached the sizes $\sim$1000 km. On the average only several percents ($\sim 3 \div 5\%$) of matter can obtain the irradiated grains. This esti-

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mate is in a good agreement with laboratory investigations [5]. As distinct from Goswami and Lal model our approach gives the possibility for explanation of irradiation data of all classes of meteorites (both chondritic and achondritic).

We must conclude that although the graat bulk of irradiated matter came from bodies with sizes indicated by Goswami and Lal [2], such irradiation occured at the stage of accumulation of large bodies. Just in this moment the characteristic time between collisions was great enough for long exposition of surfaces, the substantial portion of gas was lost and necessary transparence of swarm of preplanetary bodies was reached. It seems to us that the gas in the zone of terrestrial planets was lost before the planet completed their growth. This means that "Kioto"-model and hypothesis about preservation of gas in inner zone up to the final stage of accumulation does not fit meteoritic data. Of course we could not to exclude now the other possibility, that the irradiated grains of meteorites (including C-chondrites) were exposed after accimulation of terre strial planets. But in this case it is necessary to revise a generally accepted paradigm about pristine origin of meteoritic grains and chondrules.

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